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| 10/743,722 | 12/24/2003 | Adriana Dumitras | 2777/3276 | 8315 |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**.     2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-32* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☒ Claim(s) *8* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some *   c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date <u>See Continuation Sheet</u>.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date: 12 May 2004, 10 November 2004, 22 June 2005, 17 July 2006.

## DETAILED ACTION

1.      This is the First Action on the Merits for U.S. Application 10/743,722. Currently, claims 1-32 are pending.

### *Priority*

2.      Since applicant desires to call attention to related application 10/658,938, as stated on the Information Disclosure Statement of 12 May 2004, a specific cross-reference to the prior-filed application in compliance with 37 CFR 1.78(a)(2)(i) must be included in the first sentence(s) of the specification following the title or in an application data sheet.

3.      Since applicant desires to call attention to related application 10/875,265, as stated on the Information Disclosure Statement of 22 November 2004, a specific-cross reference to the co-pending application in compliance with 37 CFR 1.78(a)(2)(i) must be included in the first sentence(s) of the specification following the title or in an application data sheet.

4.      Application No. 10/875,265, filed 25 June 2004, repeats a substantial portion of the current application, and adds and claims additional disclosure not presented in the current application. Since the related application names an inventor or inventors named in the current application, it may constitute a continuation-in-part of the current application. Should applicant desire to obtain the benefit of the filing date of the current application, attention is directed to 35 U.S.C. 120 and 37 CFR 1.78.

## *Information Disclosure Statement*

1.      The information disclosure statement filed 22 November 2004 only repeats

documents already cited in the information disclosure statement filed 14 May 2004.

Accordingly, it has been placed in the application file, but the information referred to

therein has not been considered as to the merits a second time.

## *Claim Objections*

2.      Claim 8 is objected to under 37 CFR 1.75(c), as being of improper dependent

form for failing to further limit the subject matter of a previous claim.  Applicant is

required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper

dependent form, or rewrite the claim(s) in independent form. Claim 8 states that a

picture temporally coded adjacent to and before an I picture is coded as a P picture at

full quality or low quality.  However, claim 7 already states that a picture temporally

coded adjacent to and before an I picture is coded as a P picture, without limiting quality

of the P picture.  Claim 7 is presumed to already encompass encoding a P picture at full

quality or at low quality.

3.      Claim 8 is objected to because of the following informality: in line 2, the word "of"

should be "or".  Appropriate correction is required.

## *Claim Rejections - 35 USC § 101*

4.      35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of
> matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the
> conditions and requirements of this title.

5.      Claims 25-28 are rejected under 35 U.S.C. 101 because the claimed invention is

directed to non-statutory subject matter.  Claims 25-28 claim a "coded video signal".

Electric signals *per se* have been held as non-statutory.  See *O'Reilly v. Morse*, 56 U.S.

(15 How.) 62 (1854).

### Claim Rejections - 35 USC § 102

6.      The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public
> use or on sale in this country, more than one year prior to the date of application for patent in the United
> States.

7.      Claims 1, 5, 9-13, 18-22, and 25-29 are rejected under 35 U.S.C. 102(b) as being

anticipated by "Temporally Adaptive Motion Interpolation Exploiting Temporal Masking

in Visual Perception" (Lee et al.), cited in the Information Disclosure Statement filed 12

May 2004.  Lee et al. teaches a method for dynamically determining a Group of Picture

(GOP) structure in a video based on temporal segmentation.  Two types of

segmentation are determined, corresponding with the "termination" of claim 10 and

claim 25.  Regarding claims 12, 13, 27, and 28, a first segmentation detector

determines an abrupt scene change, and encodes an I frame at the start of a new

scene and a P frame at the end of the previous scene (pg. 515, column 1).  Regarding

claims 1, 11, 26, and 29, a second detector finds a scene segmentation point, which is a

point at which small changes in a single scene have accumulated past a certain

threshold away from a reference frame. The frame immediately preceding the scene

segmentation point becomes a P frame, and the frames in between the last reference

frame and the scene segmentation point are encoded as B frames (pg. 515, columns 1-

2). Regarding claim 5, the method of Lee et al. could be adjusted to insert 1-3 default P

frames in a GOP to avoid encoding delay (pg. 516, column 2 – pg. 517, column 1). For

a 16-frame GOP, if 1 P-frame is inserted, for example, no more than 8 B-frames could

be inserted consecutively. Even if no P-frames are inserted by default in a GOP, the

number of consecutive B-frames is limited by the GOP size of 15 or 16 frames, since a

GOP starts with an I-frame. One method to determine the accumulated distance of data

in two frames, and determining the segmentation point, is by calculating a motion

compensation error (MCE). In MCE determination, frame fm is an actual frame

predicted from a previous frame fn, and frame f'm is the pseudoframe directly predicted

from previous frame fn. Then the motion compensation error D is the absolute value

over every pixel of the difference between fm and f'm (pg. 519, column 1). If there is

consistent motion speed between frames, then D is small, since a frame can be

predicted nearly directly from a previous frame using motion compensation. However, if

there is a large variation in motion speed, then a current frame cannot be easily

predicted from a previous frame, and so D is large. Then, if D is above a threshold

value, a scene segmentation point is determined (pg. 519, column 1). Regarding claim

9, the MCE calculation determines motion compensation, which is defined as a process

of using motion vectors to eliminate or reduce the effects of motion between pictures.

Regarding claim 18, figure 1 of Lee et al. shows a Temporally Adaptive Motion Interpolation (TAMI) encoder. This encoder includes a buffer, a conventional MPEG encoder, a motion estimation unit, a scene segmentation point (SSP) detector, and a GOP Structure unit (pg. 514, column 2 – pg. 515, column 1). Regarding claim 19, the TAMI unit determines the positions of P and B pictures in a GOP (page 514, column 2). Regarding claim 20, as mentioned previously, scene segmentation may be determined by motion compensation, which is known to use motion vectors. Regarding claim 21, the Abrupt Scene Change (ASC) detector determines a scene change in an encoded video. Regarding claim 22, as mentioned above, at a scene change, an old scene ends with a P-frame and a new scene starts with an I-frame.

## Claim Rejections - 35 USC § 103

8.      The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9.      Claims 30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. Claim 30 discloses calculating motions speed in a pixel-block-by-pixel-block manner, and claim 32 discloses calculating motion vector displacements in a pixel-block-by-pixel-block manner. Lee et al. teaches measuring a distance between two pictures based on the Motion Compensation Error, which is the difference of actual pixel displacement positions to the estimated displacement of pixels based on motion

vectors (page 519, column 1). In the present invention, co-linearity is based on motion

vector displacement differences of pixel blocks. However, it would have been obvious

for one having ordinary skill in the art at the time the invention was made to compute

motion vector differences based on pixel blocks rather than individual pixels, as taught

by Lee et al., since Lee et al. performs encoding of MPEG video (pg. 514, column 1),

which was known to calculate motion vectors based on 16 x 16 macroblocks.


10.     Claims 2, 6-8, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Lee et al. in view of "Scene-Context Dependent Reference Frame Placement for

MPEG Video Coding" (Lan et al.), cited in the Information Disclosure Statement filed 12

May 2004. Claim 2 of the present application recites encoding the first frame with a

variance in motion speed as a P-frame. However, in Lee et al., the first frame with a

motion compensation error above a certain threshold is encoded as an I-frame, and the

frame immediately previous to this point is encoded as a P-frame (pg. 515, column 2).

Lan et al. teaches a picture-type assignment algorithm in which if the difference in

accumulated motion between a current frame and a reference frame is above a certain

value, the current frame is encoded as a P-frame, and becomes the next reference

frame (pg. 481, column 2).

Lee et al. discloses the claimed invention except for encoding the first frame that

does not follow a frame trend as a P-frame. Lan et al. teaches that it was known to

encode a significantly changed frame as a P-frame. Therefore, it would have been

obvious for one having ordinary skill in the art at the time the invention was made to

encode reference frames as P-frames rather than I-frames as taught by Lan et al., since it was well-known in the art that P-frames require less bits to be encoded than I-frames.

11.     Claims 6 and 17 recite coding some pictures as I pictures for a random-access policy.  Lee et al. does not teach this limitation.  Lan et al. teaches an MPEG coding method in which frame type assignment is varied.  Regarding claims 6 and 17, Lan et al. discloses forcing I frames into a coded video sequence every 15 frames to facilitate random access (pg. 486, column 1).  Regarding claim 7, in Lan et al., whenever an I-frame is encoded, the previous frame is encoded as a P-frame (pg. 481, column 1). Regarding claim 8, in Lee et al., P frames can be encoded as P1 frames which are regular MPEG P frames, or as P2 frames, which have the same bit allocation as MPEG B frames and are thus coarsely quantized (pg. 514, column 2).

Lee et al. discloses the claimed invention except for forcing I-frame encoding. Lan et al. teaches that it was known to encode I-frames at regular intervals.  Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the coding method of Lee et al. to insert periodic I frames as taught by Lan et al., since Lan et al. states in page 486, column 1 that such a modification would enable random search and pause features at playback time.


12.     Claims 3, 4, 14, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. in view of US Patent Application Publication 2002/0146071 A1 (Liu et al).  Lee et al. teaches scene change detection, but always encodes the first picture after the scene change as an I-frame and the last picture before the scene

change as a P-frame. Liu et al. teaches a scene change detection component in a

video encoder. In Liu et al., a scene change is normally encoded as an I-frame.

However, this is not always the most efficient coding method. Figure 10 shows a scene

change between frame 1001 and frame 1002. Frame 1001 was originally scheduled to

be encoded as an I-frame, but since a scene change immediately follows, much

computational effort would be wasted in calculating high-quality images immediately

after the scene change. Then, frame 1001 is instead encoded as a P-frame, and

frames 1002 and 1048 are encoded as low-quality predictive frames, since human

vision is insensitive to quality changes near a scene change (paragraph [0079]). Figure

11 gives a further example. Here, a scene change occurs immediately preceding P-

frame 1102. Frame 1104, two frames before the scene change, was originally

scheduled as an I-frame, but instead the I-frame is delayed until frame 1110, for which

motion vectors have not yet been calculated (paragraph [0080]). Finally, figure 13

shows a scene change immediately preceding P-frame 1302, which was originally

scheduled as an I-frame. However, since motion vectors 1304 and 1306 to frame 1302

have already been calculated, the I-frame is delayed until frame 1308, originally

scheduled to be the next P-frame (paragraph [0082]).

Lee et al. teaches the claimed invention except for encoding P-frames

immediately surrounding scene changes. Liu et al. teaches that it was known to encode

a frame immediately preceding or immediately following a scene change as a P-frame.

Therefore, it would have been obvious to one having ordinary skill in the art at the time

the invention was made to encode frames adjacent to scene changes as P-frames as

taught by Liu et al., since Liu et al. states in paragraph [0079] that such a modification

would increase encoding efficiency by not encoding irrelevant data near a scene

change, at which time the human eye cannot clearly distinguish details of an image.

13.     Claims 15 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Lee et al. in view of "MPEG Video Compression Standard" (Mitchell), cited in the

Information Disclosure Statement of 17 July 2006. Although in Lee et al., a default

picture is encoded as a B-frame, Lee et al. does not explicitly state that pictures

adjacent to scene changes are B-frames. However, Mitchell states that since the eye is

insensitive to image content near scene changes, image quality can be sacrificed. One

method of reducing image quality is to start a new scene with B pictures (footnote 13).

Lee et al. discloses the claimed invention except for encoding B-frames adjacent to a

scene change. Mitchell teaches that it was known to encode B-frames immediately

following a scene change. Therefore, it would have been obvious for one having

ordinary skill in the art at the time the invention was made to force B-frames

immediately following a scene change, as taught by Mitchell, since Mitchell states in

page 79 that such a modification would reduce the bit rate needed to encode a scene

change.

14.     Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et

al. in view of "Digitale Bildcodierung" (Ohm), cited in the Information Disclosure

Statement of 17 July 2006. Lee et al. teaches scene change detection based on a low

correlation between two images (pg. 515, column 1), but does not disclose the exact

method used.  Ohm teaches the Normalized Cross-Correlation Function (NCCF), shown

as equation 5.52.  NCCF is used in many pattern-matching applications, such as motion

estimation (pg. 1).  Two images, $x_a(m_a,n_a)$, and $y_j(m_a,n_a)$, are compared over pixels

$(m_a,n_a)$ in area $\Lambda$.  This corresponds with images $x_n(i,j)$ and $x_{n+1}(i,j)$ in area (M,N) in

the present invention.  Two pictures have the highest match when the NCCF is at a

maximum (pg. 3), and correspondingly, two pictures have a low match, indicative of a

scene change, when the value of NCCF is low.

Lee et al. discloses the claimed invention except for the exact method used to

determine correlation of two images.  Ohm teaches that it was known to determine how

closely two images match each other with Normalized Cross-Correlation.  Therefore, it

would have been obvious to one having ordinary skill in the art at the time the invention

was made to determine the correlation of two images using NCCF, as taught by Ohm,

since Ohm states in page 4 that such a modification would allow for a more accurate

comparison of the similarity of two images rather than by difference levels alone.


15.    Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et

al. in view of "Video Indexing Using MPEG Motion Compensation Vectors" (Ardizzone et

al.)  Conventionally, a motion vector for a block is defined as the displacement of the

block between two pictures, velocity is defined as displacement over time, and speed is

defined as the magnitude of velocity.  However, while two-dimensional displacement is

normally given with the Euclidian distance metric, the square root of the sum of the

squares of the x and y components, in claim 31, displacement is given with the

Manhattan distance metric, the sum of the x and y components. Ardizzone et al.

teaches a method for spatially segmenting an MPEG image with motion vectors (pg.

725, columns 1-2). In one step of Ardizzone et al., magnitudes of the motion vectors

are built into a histogram to determine "dominant" regions of the image (pg. 727, column

2). If a motion vector has a large magnitude, this means that its macroblock is

displaced a large distance, and so has a high speed. An experiment was performed to

determine how best to retrieve related images to a given image, by matching motion

vector characteristics (pg. 728, column 2 – pg. 729, column 1). Using a Manhattan

distance metric yielded the best result (pg. 729, column 1).

Lee et al. discloses the claimed invention except for defining pixel block

displacement with a Manhattan distance metric. Ardizzone et al. teaches that it was

known to calculate motion vector magnitude with Manhattan distance. Therefore, it

would have been obvious to one having ordinary skill in the art at the time the invention

was made to determine motion speed of an image based on the Manhattan distance

metric, as taught by Ardizzone et al., since Ardizzone et al. states in page 729, column

1, that such a modification would produce the greatest accuracy in characterizing the

motion vectors of the image.

### Conclusion

16.   The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure. US Patent 5,185,819 A (Ng et al.) teaches a video compression

system in which odd and even fields of an interlaced frame are independently coded

with different GOP structures. US Patent 5,694,171 (Katto) teaches a video encoder

with separate modes for encoding only I-frames, only I-frames and P-frames, and I-

frames, P-frames, and B-frames. US Patent 6,914,937 B2 (Takenaka) teaches an

image control apparatus that inserts a variable number of repeated B-frames into a

video signal. US Patent Application Publication 2001/0,027,689 A1 (Sugiyama) teaches

a system that encodes reference pictures as I-frames or P-frames and pictures in

between the reference pictures as B-frames. US Patent Application Publication

2002/0,071,489 A1 (Ramanzin) teaches a video encoder that encodes different video

objects with different assignment types.


Any inquiry concerning this communication or earlier communications from the

examiner should be directed to David N. Werner whose telephone number is (571) 272-

9662. The examiner can normally be reached on Monday-Friday from 8:30 AM - 5:00

PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Mehrdad Dastouri can be reached on (571) 272-7418. The fax phone

number for the organization where this application or proceeding is assigned is 571-

273-8300.

Information regarding the status of an application may be obtained from the

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DNW

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